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The Citrus Industry

JUN 1951

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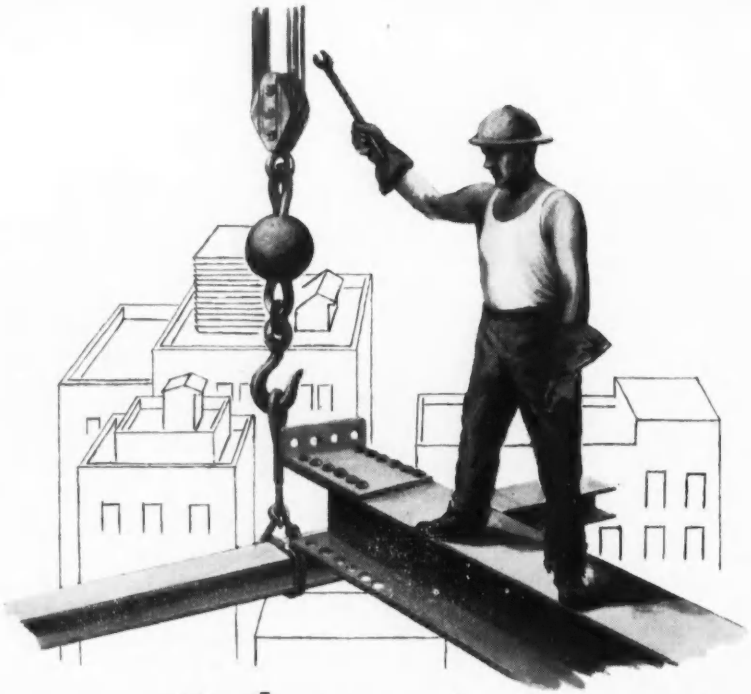

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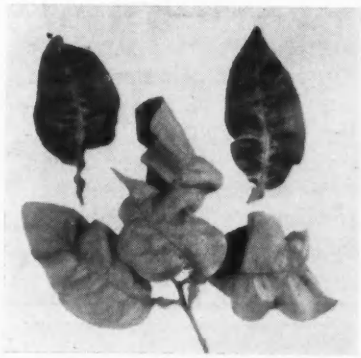
Citrus Insect Control For May 1951

J. T. GRIFFITHS, JR., W. L. THOMPSON AND R. L. PRATT*
CITRUS EXPERIMENT STATION, LAKE ALFRED, FLORIDA

Rainfall during the month of April should promote an excellent crop set throughout the entire citrus area. As a result of the rain, it is probable that melanose infection will be common throughout most groves. By the first of May most organizations will have completed the application of the post-bloom copper-wettable sulfur sprays, and the next spray will be for scale control in June or July. However, where post-bloom applications were made early in March, it may be that an additional sulfur spray will be necessary before the scalicide is applied.

For the first time in over 10 years, six-spotted mites have become a very serious problem throughout the citrus belt. These mites were causing some damage a month ago, but since that time the infestations have increased and spread so rapidly that many groves are undergoing a pronounced yellowing of the leaves particularly along the midrib, which is often accompanied by a severe leaf drop. (See figure 1.) Grapefruit is especially affected and damage is much worse in those groves where the dormant and post-bloom sprays have been inadequately applied. Where most of the old foliage had already dropped and where new foliage is now being shed as the result of six-spotted mite infestations, the situation is serious. It is to be expected that these mites will remain a problem until mid-May or longer.

Purple mite populations have not materially increased during the past month. They have just about held their own, but are abundant in some groves. Purple scale has shown definite increases during the past two months and these are expected to continue. Florida red scale has increased measurably in some groves. Although red scale infestations are generally low, growers who had serious trouble with this insect recently should be watchful since in any groves where red scales are present in abundance on spring growth, a potentially serious situation exists. Bird grasshoppers have not appeared as a problem in citrus groves so far this spring.



Six-spotted Mite Injury

Fig. 1 Distorted leaves caused by six-spotted mites. Leaves will have yellow midribs and yellow splotches when infested with these mites.

Control Measures

The control of six-spotted mites will present a spray problem for most growers. In many instances an extra spray for their control will be necessary. Many growers have complained that they have been unable to get control of six-spoted mites with either oil, DN or lime-sulfur. It is the opinion of the authors that in almost all such cases the cause was unsatisfactory coverage. Six-spotted mites live only on the underside of the leaves, and, thus, it is absolutely essential that the underside of the leaves be covered with insecticide. This means a thorough inside spray job. In order to do this properly hand guns are recommended, and it is to be expected that dusters or boom type sprayers will not produce satisfactory control. Such has been the case in actual field practice during the past 6 weeks.

As long as temperatures remain below 88°, DN sprays may be used. DN-111 should be preferred to DN Dry Mix. Neotran is available in limited quantities and will give satisfactory six-spotted mite control. Oil sprays as low as 1% actual oil will also give satisfactory results. Lime-sulfur at the rate of 2 gallons per 100 gallons of spray should be used in combination with wettable sulfur. Any of these measures will be effective if properly applied. Lime-sulfur or Neotran will be safe to use during the period when DN or oil cannot be used.

Under no circumstances should the grower expect to obtain control by using such materials as parathion or tetra-ethyl pyrophosphate. These materials will kill the active mites but the eggs will not be destroyed and the trees will again be infested within a matter of two to three weeks.

Some growers may still wish to oil sprays and precautions concerning their use will be reiterated here. Copper-oil should not be apply copper-oil sprays or straight used after the fruit is ½ to ¾ of inch in size. During the period when the fruit measures between ¾ and 1¼ inches in diameter, the use of oil is likely to produce a blemish known as oil blotch. However, after the fruit has attained a diameter of 1¼ inches, it is again safe to apply oil.

If it is desired to use an oil spray for mites, it is suggested that at least 1.3% oil be used and that it be applied thoroughly in an effort to obtain scale control. This recommendaiton is based on the premise that in some groves this spray might suffice for scale control throughout the year. This situation should not be relied upon, but with relatively low scale populations it may be possible. In general, May sprays will not maintain satisfactory scale control throughout the summer and fall. However, with parathion available for scale control in August, September or October, the chance of "getting by" may be taken. The use of parathion thus gives the grower greater flexibility in his spray program. Although 1% oil will control six-spotted mites, very little scale control will be obtained at this concentration and the grower should plan to apply an additional

(Continued on page 22)

*Written April 26, 1951. Reports of surveys by Harold Holtsberg, Cocoa; J. K. Enzor, Jr., Tavares; K. G. Townsend, Tampa; J. B. Weeks, Avon Park; and J. W. Davis, Lake Alfred.

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Storage Test Of Florida Oranges 1950

PAUL L. HARDING, JAS. S. WIANT, W. A. RADSPINNER, M. BRYAN SUNDAY, JACOB KAUFMAN,
Division of Fruit and Vegetable Crops and Diseases

THE STORAGE OF FLORIDA ORANGES[1] ORLANDO, FLORIDA, AND NEW YORK CITY, N. Y. 1950

This is a report of the 1950 storage experiments with Valencia oranges conducted at Orlando, Florida, and New York City, N. Y. The tests were a part of the investigation on the storage of citrus fruits conducted by the Bureau of Plant Industry, Soils and Agricultural Engineering, and The Refrigeration Research Foundation.

Factors Affecting the Keeping Quality of Oranges in Storage

The purpose of placing fruits in cold storage is obvious. It is primarily to extend the marketing season and to bring about a more orderly handling of perishable crops. Glutted markets usually result in the lowering of prices. Risks are involved with storage of perishable crops, and sales prices must be high enough to justify the chances taken and the additional costs involved. The principal risks in the storage of oranges are the development of decay, skin breakdown, and declining prices. The latter may be due to poor storage quality or to the competition of other fruits or fruit products.

In this report results presented are from the 1950 storage of Florida Valencia oranges. Good storage results were obtained when the fruits were stored at 30° and 32°, for 8 to 12 weeks, and when relative humidity was maintained at 85 to 90 percent. High percentages of decay usually developed at 38° F. or during the 7-day holding period at 70°, following removal from storage. Skin breakdown in the form of pitting and aging was of minor importance and averaged from about 1 to 2 percent. During storage it was found that total solids, total acid, ascorbic acid, and percent juice, gradually decreased.

The 4/5 bushel phenodor corrugated fiber-board cartons held up well under storage conditions, and in addition resulted in controlling decay slightly better than Bruce boxes with phenodor liners.

Storage tests were made to determine the keeping quality of oranges from various sources or groves. The variation in percent decay among these tests lots was not pronounced after 8 weeks storage. However, after 12 and 16 weeks it was very marked with low percentages of decay in lots designated as C, D, and E, and G.

The effect of size of fruit on keeping quality was determined. It was found that decay was somewhat correlated with size. The highest amounts of decay were found in the very large fruits, size 126; while the lowest amounts occurred in the smallest fruits, size 250.

Rootstocks on which the trees were grown slightly affected Valencia oranges in storage. Those on rough lemon had slightly more decay than those on sour or sweet orange; however, the differences were small.

Storage tests were made to determine the effect on keeping quali-

1. Acknowledgement is due W. T. Pentzer, U. S. Department of Agriculture, Beltsville, Maryland, and H. C. Diehl, Director of The Refrigeration Research Foundation, Colorado Springs, Colorado, and to the following staff members of the Division of Fruits and Vegetables Crops and Diseases: Dr. B. A. Friedman, H. W. Hruschka, Jacob Kaufman, G. Lee Roberts, Charles Miller, Earl Nelson, and Robert Serros. Acknowledgement is also due the following growers, shippers, and cold storage warehouse officials for their generous cooperation: American Fruit Growers, Inc., George W. Boutilier, George Burton, Chase and Company, Randall Chase, Frank Chase, Sydney Chase, Paul B. Christensen, Haines City Citrus Growers Assn., Arnold Hampson, Corbett Hutchinson, W. Kinney, John T. Lesley, J. I. Lyle, III, Merchants Cold Storage and Warehouse Company at Providence, Rhode Island, Merchants Refrigerating Company at New York City, N. Y., Nevins Fruit Company, Orlando Citrus Growers Assn,. J. J. Parrish, A. E. Pickard, R. V. Phillips, Waverly Growers Cooperative, Brantley A. Weathers, and Weathers Packaging Company.

ty of the following treatments as compared with untreated fruit: (a) enthylene only; (b) color-added only; and (c) enthylene-plus-color-added. The results showed that decay was less prevalent in lots of color-added only and enthylene-plus-color-added than in the controls and the enthylene only lots, and more decay was found at 38° than at 30° or 32° storage.

Tests were made on holding time and temperature following removal of oranges from storage. The studies were too limited to permit more than tentative concluusions: however, the data showed a striking increase in amounts of decay between the third and seventh day at 70° F. or higher. They also showed the advisability of returning stored fruit to low temperatures after it had been exposed to high temperatures. The data further suggested that if practicable it would be advantageous to reduce the marketing period (i.e. the period during which the fruit would be subjected to warm temperatures) for stored fruit to a maximum of two days.

A low temperature injury was observed. Affected fruits were somewhat soft, flabby, and had a water-soaked appearance over the entire surface. The affected oranges were found at 32° as well as 30° storage. The injury was believed to be a form of storage or low temperature breakdown rather than a freezing injury.

As a part of the project a study was made on the storage of 11 cars of Florida grapefruit and oranges at terminal markets. The carlots of fruit were shipped during April and May, 1950, and storage was at either New York (Jersey City, N. J.), or Providence, R. I.

Each carlot was handled in a strictly commercial manner, however, complete information was obtained as to the history of the fruit from the time it was picked until sold. Grapefruit storage was successful for only 4 weeks because of pitting but oranges were held in good condition for 12 weeks. The temperature in the commercial storages averaged about 32° F. with relative humidity at 85 to 90 percent. The amount of decay found in the various carlots of oranges was associated with the source of the oranges and length of the storage period.

It was not possible to make direct price comparisons between the fruit marketed on the day of storage with comparable fruit sold after storage. It may be stated that the 3 cars of grapefruit after storage sold for an average of $3.32 per box, and the 8 cars of oranges after storage periods for an average of $5.46 per box.

Material and Methods

The fruit for the tests, unless specified, was limited to sizes 150 and 176, and was packed in standard Bruce boxes with phenodor treated case liners. The oranges for these studies were obtained from 7 different shippers and were representative of the commercial pack and quality being marketed at that season of the year. In addition, a number of special storage tests were prepared with the cooperation of Chase and Company and the fruit for these studies was obtained from their Isleworth grove located at Windermere, Florida. Other tests were with the Weathers Packaging Service of Orlando, Florida, and the fruit was packed by the Haines City Citrus Growers Assn., at Haines City, Florida.

At Orlando and at New York City 3 cold storage rooms were set at temperatures of 30°, 32° and 38° F. The rooms were checked frequently and a continuous record was obtained by hygro-thermographs. Except for minor fluctuations the temperatures for the most part held within a narrow range. In New York the 30° F. room averaged 30.4°; the 32° F. room 32.6°; and the 38° room, 39.7° F. At Orlando there was a breakdown of the refrigeration plant on July 17th. Steps were immediately taken to make the necesary repairs, but when this failed it became necessary to transfer all of the tests lots to one commercial storage room that was maintained at 32° F. The fruit warmed up during the attempted repairs and transfer and it is very probable that this influenced the final results. The authors wish to point out that the percentages of decay would have likely been somewhat smaller had the breakdown not occurred.

Methods of procedure and of inspections of fruit, unless indicated otherwise, were identical with those used in the tests of 1949. In scoring the several types of skin breakdown, a given fruit showing both aging and pitting was scored under the defect that was considered the more serious blemish. Decay was always considered more serious than any type of skin breakdown. Decayed fruits were scored under stem-end rot when their symptoms were characteristic of **Diplodia** rot or **Phomopsis** rot, even though the decay occurred elsewhere than at the stem end. Three inspections were made; namely, at the time the boxes were removed from storage, 3 days after removal, and 7 days after removal. During this 7-day holding period the temperature was 70° F. and the relative humidity 85 to 90 percent.

As a result of two previous seasons' storage experiments it was concluded that a 7-day holding period at 70° F. was too severe a test for fruit removed from cold storage; that stored fruit might normally be expected to move through marketing channels and reach the consumer during the first 3 days after removal from storage. The results of the 3-day inspections are therefore considered to have far greater significance than those of the 7-day inspection. It might be pointed out, however, that the 7-day inspection was retained for the purpose of correlating the present season's results with those of 1948 and 1949.

The phenodor (diphenyl-treated) liners were removed at the first inspection. Decayed fruits were removed and discarded at the first and second inspections before repacking the test boxes. The amount of decay recorded for the second and third inspections is cumulative; that is. it includes decay counts for all previous inspections. Pitting and aging records of the second inspection and commercial breakdown of the third inspection are not cumulative, but instead are based on actual counts made at the particular inspection. The term "commercial breakdown" is equivalent to the total of moderate and severe aging and moderate and severe pitting. It should be noted that decays other than stem-end rots and **Penicillium** rots are not listed by specific types, but are with total decay in each instance. Thus, total decay may be greater than the sum of decay attributed to stem-end rot and **Penicillium** rot.

Samples of 25 oranges size (150) were used for chemical analyses and taste tests. The fruits were taken at the time of the second and third inspections, and the determinations were made in duplicate on the composited juice. In order to be able to calculate cumulative percent decay for all 3 inspections, it was necessary to apply a correction factor to decay records

of the 7-day inspection for those boxes from which samples were removed for juicing. In doing so, it was assumed that had the 25 fruits been held for the additional 4-day period they would have become affected with decay in the same proportion as those not so removed.

RESULTS AT ORLANDO, FLORIDA

Effect of Storage Temperature on Decay, Pitting, Aging and Composition

Equally good results were obtained when oranges were stored at 30° and 32°, whereas high percentages of decay developed during storage at 38° F. Insignificant to small amounts of decay developed during 8 and 12 weeks at 30° and 32° F. Much decay developed during storage at 38° and during the 7-day holding period at 70°. Comparatively small amounts of decay developed during the first 3 days at 70°, but the amount increased rather rapidly between the third and seventh day. The results also indicate that decay increased with the length of storage, being much higher after storage for 16 weeks than after storage for 12 or 8 weeks.

Skin breakdown in the form of storage pitting or aging was of minor commercial importance and severe pitting seldom reached 1 percent.

The percentages of fruit that showed aging were small, but somewhat greater than those showing pitting. More aging developed during the 7-day holding period at 70° F. but averaged only about 2 percent.

Chemical analyses were made on the juice of Valencia oranges to determine the changes in internal composition of the fruit during storage. Most of the chemical constituents followed definite trends and total solids, total acid, ascorbic acid and percent juice decreased with storage. Different storage temperatures appeared to have little influence on composition. It did, however, affect the flavor of the juice and the taste tests showed that fruits from 30° and 32° storage were more favorably rated than those from 38° storage. The loss in weight was calculated. There appeared to be very little difference between 30° and 32° while the greatest loss was noted with storage at 38°. For example, at 32° loss of weight after 8 weeks storage generally averaged about 1.2 percent; after 12 weeks storage, 2 percent; after 16 weeks, 3.2 percent. At 38° loss of weight after 8 weeks storage amounted to 2.5 percent; after 12 weeks, 4.7; and after 16 weeks, 6.2 percent.

Phenodor Treated Corrugated Fiber Containers Versus Phenodor Case Liners

A series of storage tests were conducted in which comparisons were made between the phenodor treated fiber container and the phenodor case liner. The 2 test lots of fruit were packed by 1 shipper from the same crop of fruit. Each lot consisted of 20 boxes of fruit and storage was at 30°, 32° and 38° F. Inspections on the fruit were made at the end of each storage period and twice during the holding test at 70° F. The fruit and containers used in these storage tests were furnished by the Weathers Packaging Service and packed by the Haines City Citrus Growers Association.

The standard 4/5 bushel phenodor corrugated carton held up in storare remarkably well. The cartons were easy to handle since they were only half as large as the standard Bruce box. Results on keeping quality of the fruit showed slightly smaller amounts of decay in the phenodor cartons than in the phenodor linered Bruce boxes. Less decay developed at storage temperatures of 30° and 32° than at 38° F.

EFFECT OF GROVE VARIATION ON STORAGE QUALITY

Storage tests were made to determine the keeping quality of oranges from various sources. The test lots consisted of fruit from 9 different groves and were stored for 8, 12, and 16 weeks at 30°, 32°, and 38° F. Each lot consisted of 20 boxes of fruit representing the quality and pack going to market. Eight lots were packed in standard 1-3/5 bushel Bruce boxes with phenodor case liners, while the remaining lot was packed in standard 4/5 bushel phenodor treated corrugated fiber cartons. The fruit was inspected at the end of storage test and twice during the 7-day holding period at 70° F.

The results of these tests indicate considerable variation in storage quality among lots or groves. There did not appear to be very much difference in percentage decay between storage at 30° and 32° F. Differences, however, were found between 32° and 38° storage, with much higher percentages of decay developing at the latter storage temperature.

Effect of Size of Fruit on Decay in Storage

Storage tests have been made to determine the effect of size of fruit on storage quality. These tests included 6 boxes of fruit of the following sizes: 126, 150, 176, 200, 216, and 250. Storage was for 8 and 12 weeks at 32° F. The oranges were inspected at the end of each period and twice after transfer to 70° F.

Small amounts of decay developed during 8 weeks and 12 weeks storage at 32° F. and decay was insignificantly influenced by size. Most of the decay occurred during the holding test at 70° F. and developed largely between the third and seventh day. In this connection, it may be observed that decay was to some extent correlated with the size of the fruit, the highest amounts of decay being found in the very large fruits, size 126; while the lowest amounts were found in the smallest fruits, size 250. The data were not always consistent and the most striking inconsistency was the rather low percentages of decay found in size 150.

Chemical analyses were made on these fruits to determine the effect of size on composition. It may be observed that size of fruits did not affect percent juice per fruit. It did, however, affect the total solids, total acid and ascorbic acid content in that lower amounts were associated with the larger fruits and higher amounts with the smaller fruits. It may also be noted that the total acid, ascorbic acid, and percent juice per fruit decreased with length of storage while total solids increased.

The Relation of Rootstocks to Storage Quality

Tests were made to determine the keeping quality of Valencia oranges grown on rough lemon, sour orange, and sweet orange rootstocks. The fruit was obtained from Chase and Company and came from their groves located at Windermere, Florida. Each storage lot consisted of 20 boxes and the fruit was stored for 8, 12, and 16 weeks at 30°, 32°, and 38° F. The fruits were examined at the end of each storage period and twice during the holding test at 70° F.

In these tests, rootstocks af-

(Continued on Page 22)

Canned Tangerine Juice

II. Further Studies [1,2]

EDWIN L. MOORE, C. D. ATKINS, RICHARD L. HUGGART, AND L. G. MacDOWELL
FLORIDA CITRUS COMMISSION

(Concluded From Last Issue)

ANALYTICAL METHODS

Vacuum: — A commercial-type vacuum gauge was used to measure vacuum.

Headspace:—The headspace was measured in sixteenths of an inch from the top of the container to the surface of the juice, and is expressed as gross headspace.

Ascorbic Acid:—The ascorbic acid was determined by titrating 5 ml. of the centrifuged juice from the pulp determination, diluted with an equal volume of a mixture of 3-percent metaphosphoric acid and 8-percent acetic acid, with 0.05 percent 2,6-dichlorophenolindophenol, that had been standardized against ascorbic acid (Cebione-Merck).

pH:—The pH was measured on a Beckman Model M glass electrode pH meter.

Recoverable Peel Oil:—The percent by volume of recoverable peel oil was determined by the usual Clevenger steam distillation method.

Brix:—On some of the juices, the °Brix was determined by spindle. On the remainder of the juices, the °Brix was determined using a Bausch and Lomb precision oil refractometer with sodium light source.

Total Acid:—The total acidity was determined by titrating 25 ml. of the juice with standard sodium hydroxide, using phenolphthalein as the indicator. Acidity was calculated as anhydrous citric acid.

Color:—To measure color, the juices in test tubes were compared with the color charts of Maerz and Paul (1930), using daylight plus a fluorescent daylight lamp as a light source.

Pulp:—The percentage pulp was estimated by centrifuging a 50 ml. sample of juice at full speed in an International Clinical type centrifuge for 15 minutes.

Flavor:—Flavor was judged by taste according to the following arbitrary standard that has been used in previous work.

Good—average flavor of fresh pack.

Fair—slightly-off or slightly-aged flavor.

Ordinary—noticeably-off or noticeably-aged flavor.

Poor—distinctly-off or distinctly-aged flavor.

Very poor—unpalatable or objectionable.

RESULTS AND DISCUSSION

In most instances, examinations were made on the canned tangerine juices initially, and at the end of 3, 6, and 12 months storage, for vacuum, headspace, ascorbic acid, pH, recoverable peel oil, Brix, total acid, color, pulp, and flavor.

Vacuum and Headspace: — No vacuum or headspace measurements were made initially, but were made on the canned tangerine juices after storage at both 40° and 80°F. for 3, 6, and 12 months.

The vacuum readings were slightly erratic, and there were as wide variations between cans in the same pack as between different packs. For this reason, the vacuum measurements have been averaged and are presented in Table 2 for their relationship to the retention of ascorbic acid in the canned juices.

The headspace measurements have also been averaged and are presented in Table 2. Individual headspace measurements appeared to be associated with foaminess in the juice when the juice was not deaerated.

Retention of Ascorbic Acid during Processing:—The average retention of ascorbic acid during processing for all 22 packs in plain tin was 98.0 percent and for all 23 packs in enamel it was 96.4 percent. This does not take into account the slight concentration of the juices that were flashed under vacuum, but does represent an average figure for these juices processed under numerous conditions.

Experimental runs A, B, C, and D are the only runs where the effect of pasteurization temperatures of 205° and 240°F. may be compared directly because only in these runs were the juices treated alike except for the temperature of pasteurization. Average values for these runs indicated that there was no apparent difference in retention of ascorbic acid between the juices processed at these two pasteurization temperatures.

The effects of non-deaeration and deaeration of the juices are illustrated by experimental runs E and F, in which the retentions of ascorbic acid during processing for

Table 2

Average Values for Ascorbic Acid Content, Retention of Ascorbic Acid, Vacuum and Headspace for 22 Packs of Tangerine Juices in Plain Tin Cans and 23 Packs of Tangerine Juices in Enameled Cans during storage over a 12-Months' Period at 40 degrees and 80 degrees F.

Storage Period in Months	40°F.								80°F.							
	Plain Tin				Enamel				Plain Tin				Enamel			
	Ascorbic Acid		Vacuum	Gross Headspace	Ascorbic Acid		Vacuum	Gross Headspace	Ascorbic Acid		Vacuum	Gross Headspace	Ascorbic Acid		Vacuum	Gross Headspace
	mg./100 ml.	Retention %	Inches	16 th's inch	mg./100 ml.	Retention %	Inches	16 th's inch	mg./100 ml.	Retention %	Inches	16 th's inch	mg./100 ml.	Retention %	Inches	16 th's inch
0	18.6	100.0	—	—	18.2	100.0	—	—	18.6	100.0	—	—	18.2	100.0	—	—
3	18.7	100.5	9	4	17.6	96.7	9	4	17.8	95.7	8	4	16.1	88.5	9	4
6	18.3	98.4	11	4	16.4	90.1	10	4	16.6	89.2	9	4	14.0	76.9	9	4
12	18.4	98.9	11	4	17.1	94.0	12	4	15.2	81.7	11	4	13.5	74.2	12	4

the juices have been averaged and are given in Table 3.

These results indicate that deaeration may have a beneficial effect on retention of ascorbic acid during processing as well as aiding in reducing foaminess at the filler. The results also indicated, that although a juice may be deaerated, any processing operations that incorporated air into the juice might have a detrimental effect on retention of ascorbic acid during processing.

Table 3.
Average Retention of Ascorbic Acid in Juices during Processing (Runs E and F)

Treatment	Plain Tin Percent	Enamel percent
Non-deaerated	94.4	94.1
Deaerated	98.9	96.8
Deaerated, then air beat back in	94.4	93.3

Retention of Ascorbic Acid during Storage:—The results of the determinations of ascorbic acid in the canned tangerine juices during storage have been averaged and are presented in Table 2.

The average retention of ascorbic acid was higher in the juices packed in plain tin cans than in the juices packed in enameled cans as may be seen by referring to Table 2. At the end of 12 months storage, the average retention of ascorbic acid in the juices packed in plain tin cans and stored at 80°F. was 82 percent, and 74 percent for the juices packed in enameled cans. At 40°F. storage temperature the average retention was 99 percent in the juices packed in plain tin cans and 94 percent for the juices packed in enameled cans. No explanation is offered for the apparent increase in ascorbic acid content between the 6 and 12 months examinations for the juices packed in enameled cans and stored at 40°F.

The only trend in retention of ascorbic acid during storage of the canned juices in experimental runs A, B, C, and D was the higher retentions of ascorbic acid in juices packed in plain tin cans as compared to those juices packed in enameled cans. No difference was noted as regards temperature of pasteurization.

The effects of non-deaeration and deaeration of the juices on retention of ascorbic acid during storage as illustrated by experimental runs E and F were probably influenced by the varying headspaces in these canned juices. But the results did indicate the advisability of keeping the headspace at a practical minimum for best retention of ascorbic acid during storage of canned tangerine juice.

From the standpoint of retention of ascorbic acid during storage, based on experimental runs G, H, and I, it made no apparent difference whether the juice was deoiled and then pasteurized, or simultaneously pasteurized, deaerated, and deoiled; it made no apparent difference in retention of ascorbic acid in the canned juice during storage whether the condensate was discarded or centrifuged free of oil and the water phase returned to the juice.

pH:—No examinations for pH were made initially on the fresh or canned juices, but were made on the canned juices after storage at 40° and 80°F. for 3, 6, and 12 months.

With the exception of pH values of 3.7 for some of the canned juices from the December 11, 1946 fruit (slightly higher acid fruit) and values of 4.0 for two of the juices from the January 21, 1947 fruit, all canned juices had pH values of 3.8 or 3.9 at 3, 6, and 12 months. Half of the canned juices stored at both 40° and 80°F. did not change in pH between the examinations at the end of 3 and 12 months; other juices showed an increase in pH from 3.8 to 3.9, and other juices a decrease in pH from 3.9 to 3.8 and from 3.8 to 3.7. The juices pasteurized at 240°F. and packed in enameled cans and stored at 80°F. showed the most marked tendency to decrease by 0.1 pH during this storage period. But assuming the accuracy of the pH meter used as 0.1 pH, it may be said that these experimental packs of tangerine juices, regardless of pasteurization temperatures, packing in plain tin or enameled cans, or temperature of storage, did not show a significant change in pH between the examinations at the end of 3 months and 12 months.

Recoverable Peel Oil:—The recoverable peel oil content was determined initially on some of the fresh fruit juices, and on the juices canned in plain tin for each processing variation in an experimental run; it was assumed that the juices canned in enamel from that same processing variation would have the same recoverable peel oil content. The results are presented in Table 1. It will be noted that the deoiling processes used resulted in a peel oil content in the freshly canned juice of 0.015 percent or below. It will also be noted from experimental runs H and I, that the method for simultaneously pasteurizing, deaerating, and deoiling tangerine juice resulted in a removal of nearly 80 percent of the

(Continued on page 11)

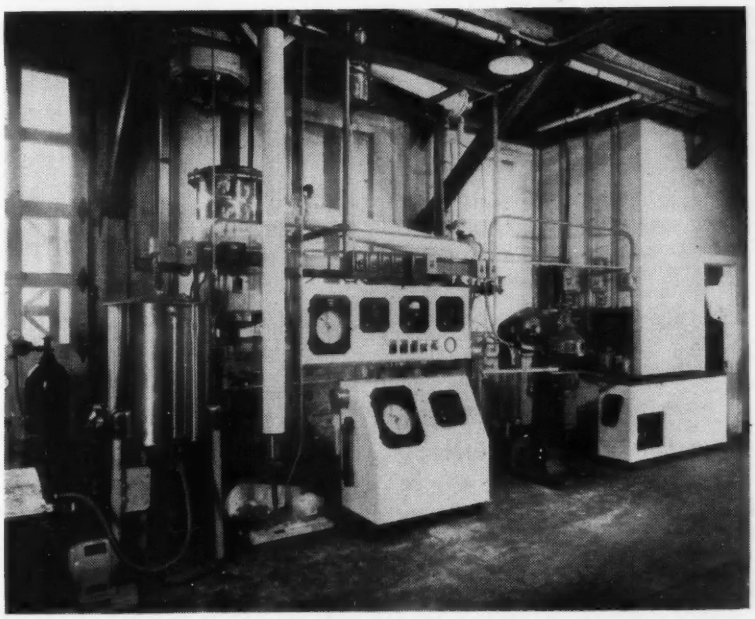

Figure 2. Partial View of the Pilot Plant for Processing Tangerine Juice.

The Citrus Industry

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ADVERTISING TAX FUND HIKED; SLIGHT CHANGE IN CITRUS CODE

Slight changes in the Florida citrus code and increased per box tax in the advertising fund proposed by the Florida Citrus Commission were unanimously approved by the joint Senate and House citrus committees. Later the bill was approved by the Senate with but one dissenting vote and as this is written it appears that passage by the House is certain.

To provide a greater advertising fund for Florida citrus fruits, a hike of one cent per box across the board is provided, raising the tax on oranges from two to three cents per box; on grapefruit from three to four cents per box and on processed fruit from two to three cents. This increase in the per box tax is expected to provide approximately $900,000 per year for the advertising fund which now is about $2,500,000. This additional fund will be used in new territory and along new channels and had, apparently, the endorsement of preponderant elements of the industry.

Slight changes in the maturity standards for tangerines and grapefruit provide that after Nov. 15 tangerines having 8.75 solids will be considered ripe. This is a drop from nine solids. Pink and red seedless grapefruit would be lowered a half solid point to 7 percent after Dec. 1.' All grapefruit could go to canneries after Jan. 1 on a ratio of 6 to 1 solids and acids. This same ratio would apply to all fruit after April 15.

The bill as approved by the joint committees and passed by the Senate is the result of frequent meetings and careful study by the Florida Citrus Commission after numerous conferences with growers and shippers.

MUTUAL HIKES ORANGE FLOOR PRICES

Responding to the demand of growers, Florida Citrus Mutual, big citrus cooperative, on April 27 hiked the floor price on oranges to a point designed to give the grower $2 per box on the tree.

A minimum price of $2.37½ for Valencias delivered to canning and concentrate plants, and $3.15, $3.35 and $3.50 as floor prices for oranges going into fresh fruit channels. The lower price range covers sizes 126 to 150; the middle price, size 176, and the higher price, for size 200 and smaller.

Mutual directors had long held out against setting a floor price at this time, contending that the law of supply and demand would bring about an adjustment without drastic action, but finally gave way to the demands of growers. As this is written, it is too early to judge how effective the application of the floor price may be. Growers are hoping that it will stand the test of actual marketing.

FOREIGN PEST HAZARD INCREASES

Under the above caption, the California Citrograph calls attention to the growing hazard of foreign plant pests being brought into the United States. While the article was written with a view to the danger threatening California, it is quite as applicable to Florida, and stresses the need for greater vigilance on the part of plant inspectors and other State and Federal agencies.

Here is what he California Citrograph has to say:

"A combination of circumstances is enlarging the hazard of bringing new plant pests into this country. The continued increase of civilian air tronsport, as well as military air traffic, means that many more planes are arriving daily from overseas, funnelled through Hawaii, than at any time in the past, and landing at more points of entry, some inland. With more planes to cover, currently there are fewer inspectors available to do the important job of inspecting aircraft. Some planes from Europe now get into the United States without inspection.

"One aftermath of every war has been the establishment of pests in new areas. There could be new pests here now, unrecognized as yet.

"It is generally agreed that civilian services should be curtailed under the pressure of the military program. As a matter of principle any cuts in such important protective services should come only after every effort has been made to maintain them.

"With the grim possibility that pests might be introduced, costing millions of dollars to eradicate or control, perhaps ruining certain segments of agriculture, it would seem poor economy to cutrail inspection services. Possibly they might be maintained or even strengthened by suitable legislative or administrative moves. It is vitally important to the national welfare that our food producing industries should be protected. What happened in Hawaii when it was invaded by the Oriental fruit fly a few years ago is a sobering thought."

Arthur C. Brown, Florida's efficient plant commissioner, has long urged the need for greater vigilance at this time, and the above from California merely emphasizes the need which he has so forcefully called to the attention of Government authorities.

Reports of field men from every section of the Florida citrus area indicate that the early bloom is exceptionally heavy and that growers are exerting every effort to assure that this bloom produces a bumper crop of quality fruit.

CANNED TANGARINE JUICE

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peel oil as compared to the control canned juice that had not been deoiled.

Brix and Acid:—In general, the fruit obtained on December 11, 1946, and used for experimental runs A and B tested 10.2° Brix, had a total acid content of 0.75 percent, and Brix/acid ratio of 13.6; the fruit obtained on January 21, 1947, and used for experimental runs C, D, E, and F tested 11.8° Brix, had a total acid content of 0.66 percent, and Brix/acid ratio of 17.9; and the fruit obtained on January 30, 1947, and used for experimental runs G, H, and I tested 12.2° Brix, had a total acid content of 0.66 percent, and Brix/acid ratio of 18.5.

It was observed that those juices that were simultaneously pasteurized, deaerated, and deoiled with discarding of the condensate averaged about 2 percent higher in Brix and total acid than the corresponding control canned juices. This would indicate about a 2 percent evaporation in the flash-boiling process. This 2 percent evaporation is less than the 3 to 4 percent evaporation for this process reported by Moore, Atkins, MacDowell, Browne, and Wiederhold (1948). But, as already pointed out, if a higher vacuum than 5 inches was used in the flash chamber in the present work, the pump-out pump lost its prime. But even with this 2 percent evaporation nearly 80 percent of the peel oil was removed as compared to the control canned juice that had not been deoiled. Thus this method for simultaneous pasteurization, deaeration, and deoiling appears to be efficient in the removal of peel oil.

Color:—All canned juices for all examination periods were matched with the Maerz and Paul color standards at 10-L-2, 10-L-3, 10-L-4, and 10-L-5.

It was generally true that the samples stored at 80°F. showed a greater tendency to bleach than the samples stored at 40°F. In several instances, namely, experimental runs B, G, and H, the juices packed in plain tin showed a greater bleaching than the corresponding juices packed in enameled cans. It was also observed that many of the juices during storage lost their typical tangerine juice color and resembled orange juice more than tangerine juice.

The fruit obtained on January 30, 1947, and used in experimental runs G, H, and I apparently gave a juice of slightly deeper color than the other two batches of fruit used.

The results of experimental runs E and F indicated that it made no apparent difference whether a tangerine juice was deaerated or not before pasteurization as regards color changes during storage of the canned juice.

General Appearance of the Cans after 12 Months:—After storage of the canned juices for 12 months at 40°F., all enameled cans appeared to be in good condition and better than the corresponding samples stored at 80°F. There were four samples, E-2, (experimental run E, pack No. 2), E-6, H-2, and I-5 that appeared to show a little more pinholing and blistering of the enamel than the others. These four juices had not been deaerated and had peel oil contents of 0.032, 0.029, 0.025, and 0.024 percent, respectively. This might be an indication that low-air content and low-peel oil content would be desirable when packing tangerine juices in enameled cans. However,

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there was no flaking off of the enamel. As would be expected, the plain tin cans from the samples stored at 40°F. showed less etching than the corresponding cans for the 80°F. samples.

After storage of the juices for 12 months at 80°F., all enameled cans showed considerable pinholing and blistering with no apparent significant differences between the packs. There was no flaking off of any enamel. All plain tin cans showed considerable etching.

General Appearance of the Canned Juices after 12 Months:—After 12 months storage at 40°F. all juices of experimental run B showed clarification that was not quite complete. These juices and all other juices stored at 40°F. for this period of time showed some curdling of the solids.

After 12 months storage at 80°F., all juices of experimental run B showed complete clarification; C-1 and C-2 were slightly clarified; D-5 was very slightly clarified; G-3 and G-4 were very slightly clarified; and I-4 showed very slight clarification. These juice packs and all other juices stored at 80°F. for this period of time showed some curdling of the solids.

Flavor — Cooked Taste:—The canned juices were examined initially by four tasters for the presence of a cooked taste. The juices that were judged to have no cooked taste were those that had been deaerated and deoiled to 0.004 percent oil or below prior to pasteurization, (the four packs of experimental run C); and G-1, G-2 and the four packs of experimental run I where the juices had been flash-boiled to 0.006 percent oil or below with or without return of the water phase of the centrifuged condensate. The remainder of the juices were judged to have a slightly cooked taste. The four tasters judged no juice as having a very cooked taste. Where the juices were judged to have no cooked taste, the same held true whether the juice was packed in plain tin or enamel cans. Thus it appears that the cooked taste is dependent more on the method of processing rather than the type of can in which the juice is packed. The results might suggest that deoiling to a low oil content or the use of the flash-boiling process might be an aid in reducing the amount of cooked flavor in processed tangerine juice, but further work should be carried out on this phase of the processing procedure to arrive at definite conclusions.

Flavor — Peel Oil:—The initial examinations of the canned tangerine juices revealed that the four individuals tasting these juices preferred certain peel oili contents. A peel oil content of 0.005 percent or below by volume was difficult to detect and was frequently rated by the tasters as "no oil". The most pleasing peel oil content appeared to be in the range of 0.005 to 0.010 percent. Between the range of 0.010 to 0.030 percent, the juices were scored as being slightly oily. Juices containing more than 0.030 percent peel oil were often judged to be very oily. These samplings for peel oil preferences were not continued beyond the initial examinations.

Flavor — Body of the Juice:—It might be expected that the size of the screen used would exert an influence on the body of the juice by varying the insoluble solids (pulp). However, pulp measurements made by centrifuging samples of the juices did not indicate any clear cut distinctions. Four sizes of screens were used in the preparation of the packs; namely, 0.030, 1/16, 0.027, and 0.040 inch perforations.

Besides the screen size, the Brix (soluble solids) influences the body of the juice as determined by tasting. With the exception of experimental runs A and B, all canned juices were tasted initially for "body" of the juice. The juices that were judged to have a medium body,—the four packs of experimental run G, and the four packs of experimental run I that had been flash boiled, were 12° Brix and had been screened through a screen with 0.040 inch perforations. The majority of the juices were judged to have a light body. An analysis of the results indicated that the Brix (soluble solids) of these juices had more to do with the body of the juices than did the size screen used. No scoring for body of the juice was done after the initial examination.

Flavor — Preferences and Over-All Ratings:—According to the preferences of the four tasters, it appeared that the quality of the fruit became better as the season progressed. In general, the canned juices from the fruit obtained on January 21, 1947, were preferred over the canned juices from the fruit obtained on December 11, 1946; and the canned juices from the fruit obtained on January 30, 1947, were preferred over the canned juices from the fruit obtained on January 21, 1947. However, part of this apparent preference may have been influenced by the length of time the fruit was stored at the laboratory before processing, especially in the instance of the fruit obtained on December 11, 1946, and that had been stored at 40°F. for 29 days and 30 days before processing.

The over-all flavor ratings of the tasters (four tasters at initial and 3 months examinations; three tasters at 6 and 12 months examinations) have been averaged for the 22 juices in plain tin cans and the 23 juices in enameled cans for each storage period examination for each storage temperature, and are given in Table 4.

The above over-all flavor ratings represent averages for all processing variations used in this work, and give a preliminary idea of the flavor retention qualities of canned tangerine juice in general.

As would be expected, samples of the canned juices stored at 40°F. retained their flavor better than the samples stored at 80°F. those samples stored at 80°F. for 12 months were considered to average slightly-off in flavor; whereas, those samples tsored at 80°F. for 12 months were considered to average distinctly-off in flavor. This emphasizes the desirability of storing canned tangerine juices at temperatures low enough to insure retention of good flavor.

At 6 months storage and thereafter, the average preference of

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Table 4.
Average Flavor Ratings for Canned Tangerine Juices after Storage at 40 degrees and 80 degrees F.

Storage period in months	40°F.		80°F.	
	Plain tin	Enamel	Plain tin	Enamel
0	Good to fair	Good to fair	Good to fair	Good to fair
3	Good to fair	Good to fair	Fair to ordinary	Fair to ordinary
6	Good	Good to fair	Ordinary	Ordinary to poor
12	Fair	Fair to ordinary	Poor	Poor to very poor

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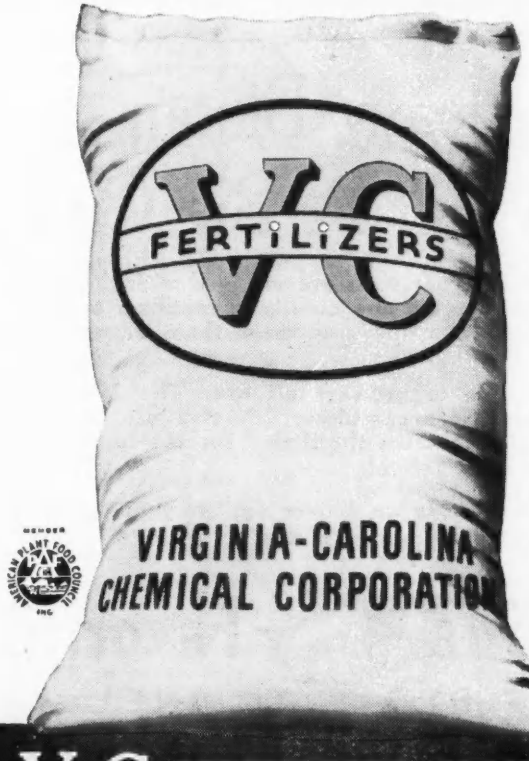

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CANNED TANGARINE JUICE
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the four tasters was for the juices packed in plain tin cans over those packed in enameled cans. Although this difference was not pronounced, the trend was consistent.

Other factors than this preference for juices packed in plain tin cans over those packed in enameled cans will now be pointed out for individual experimental runs, but not between experimental runs because of the variation in the quality of the fruit used for each experimental run as influenced by batch of fruit and length of storage of the fruit before processing.

During storage of the canned juices at either 40° or 80°F. for 12 months, those packs of experimental runs A, B, C, and D showed no difference in retention of flavor as influenced by temperature of pasteurization on deaerated or deoiled juices. No differences in flavor retention as influenced by deaeration or non-deaeration of the juices before pasteurization at 205° and 240°F. were shown by the packs of experimental runs E and F. The juices that had been simultaneously pasteurized, deaerated, and deoiled in experimental runs G, H, and I had the same retention of flavor as the other juices that had been deoiled before pasteurization at either 205° or 240°F. When the juices were simultaneously pasteurized, deaerated, and deoiled as in experimental run I, it appeared to make no difference as regards retention of flavor whether the condensate was discarded or centrifuged free of oil and the water phase returned to the juice. That juice with the condensate discarded was of slightly higher Brix; whereas the juice with the water phase of the condensate returned to the juice had a slightly better bouquet. In these preliminary tests it was not demonstrated from a standpoint of retention of flavor whether the condensate should be discarded or centrifuged free of oil and the water phase returned to the juice. The returning or discarding of the condensate might also involve economics to the canner.

SUMMARY

A pilot plant of approximately ½ gallon -per-minute capacity was built for processing tangerine juice by several methods that might be said to simulate the processes in commercial use at that time for canning citrus juices, and also for continuing work on our recently developed process for simultaneously pasteurizing, deaerating, and deoiling of tangerine juice. A description of this pilot plant is given.

Using this pilot plant, 9 experimental runs consisting of 45 juice packs, were made to study the effects of deaeration; deoiling; temperatures of pasteurization; the method for simultaneous pasteurization, deaeration, and deoiling with and without return of the water phase of the centrifuged condensate (condensed vapor); and packaging in plain tin versus citrus enamel cans. A description of the preparation of these 45 juice packs is given.

These 45 juice packs were divided for 40° and 80°F. storage. In most instances, examinations were made on the canned tangerine juices initially, and at the end of 3, 6, and 12 months storage, for vacuum, headspace, ascorbic acid, pH, recoverable peel oil, Brix, total acid, color, pulp, and flavor.

Individual headspace measurements appeared to be associated with foaminess in the juice when the juice was not deaerated.

There was no apparent difference in retention of ascorbic acid during processing between juices pasteurized at 205° and 240°F. The results on retention of ascorbic acid during processing indicated that deaeration may have a beneficial effect on retention of ascorbic acid during processing as well as aiding to reduce foaminess at the filler. The results also indicated, that although a juice may be deaerated, any processing operations that incorporated air into the juice might have a detrimental effect on retention of ascorbic acid during processing.

The average retention of ascorbic acid in the canned juices during storage was lower in the enameled cans than in the plain tin cans. Apparently, from the standpoint of retention of ascorbic acid during storage of the canned juices, it made little difference whether the juice was deoiled and then pasteurized or simultaneously pasteurized, deaerated, and deoiled. Apparently too, when the juice was simultaneously pasteurized, deaerated, and deoiled, it made little difference in retention of ascorbic acid in the canned juice during storage whether the condensate was discarded or centrifuged of oil and the water

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phase returned to the juice.

The packs of tangerine juices, regardless of pasteurization temperatures, canning in plain tin or enameled cans, or temperatures of storage, did not show what were considered to be significant changes in pH between the examinations at the end of 3 months and 12 months.

The method for simultaneously pasteurizing, deaerating, and deoiling tangerine juice resulted in a removal of nearly 80 percent of the recoverable peel oil as compared to the control canned juice that had not been deoiled.

It was observed that many of the canned juices during storage lost their typical tangerine color and resembled orange juice in color more than tangerine juice.

There was some indication that low-air content and low-peel oil content would be desirable when packing tangerine juices in enameled cans to minimize by pinholing and blistering of the enamel during storage of the canned juices.

All of the canned juices, whether stored at 40° or 80°F. for 12 months, showed some curdling of the solids.

Some results are presented on the desirability of different amounts of peel oil in the freshly processed juice.

As would be expected, samples of the canned juices stored at 40°F. retained their flavor better than the samples stored at 80°F. At 6 months storage and thereafter, the average preference of the tasters was for the juices packed in plain tin cans over those packed in enameled cans. Although this difference was not pronounced, the trend was consistent. No difference in flavor retention was found as influenced by temperature of pasteurization on deaerated or deoiled juices. No difference in flavor retention was found as influenced by deaeration or non-deaeration of the juices before pasteurization. The juices that had been simultaneously pasteurized, deaerated, and deoiled had the same flavor retention as the other juices that had been deoiled before pasteurization.

CONCLUSIONS

As would be expected, storage of the canned juices at 40°F. resulted in better retention of flavor and ascorbic acid than storage of the canned juices at 80°F.

Tangerine juices packed in plain tin cans averaged higher in retention of flavor and ascorbic acid during storage than the juices packed in enameled cans.

The process for simultaneous pasteurization, deaeration, and deoiling of tangerine juice was efficient in the removal of peel oil, gave canned tangerine juices as good as those processed by the conventional methods, and although less flexible, appeared to offer other operating advantages.

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Situation In In The Lower Grande Valley

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April 8th, 9th, 10th, 11th we were in the Rio Grande Valley visiting the Texas citrus area. From Brownsville we made a 400 mile trip criss-crossing the entire citrus area. All in all, we visited 23 citrus communities and observed the damage done to citrus by the Deceber and February freezes.

The soil is heavy, and in many cases, black in appearance. Many areas had had no appreciable amounts of rain since last June. The water supply was becoming critical but irrigation was being done everywhere.

With no exception, the large trees were killed back to the largest limbs or the trunk, and small trees were killed back to the banks. High ground locations were damaged to the same extent as low ground. Differences in soils were not a factor in the damage done. However, the health of the individual tree did make a difference in resistance to damage and ailing trees were killed to the ground. Oranges did stand the cold better than grapefruit, and white seedless better than pinks or reds. However, very few groves appeared to be abandoned.

During the December freeze leaves were knocked off and some wood was killed. In late January, the trees were in open bloom and growth. From an average daily temperature of 70, the mercury skidded to as low as 16 degrees and remained below 32 degrees for four nights and three days. The seed in the fruit was frozen as solidly as the pulp and rind. There will practically be no fruit marketed from Texas next year (1951-1952), very little the next year (1952-1953), and our guess is probably six million boxes the following year (1953-54).

Vegetables were also frozen twice, and the valley economy is, of course, hard hit. It is estimated that it has left 90% of the growers in debt. Many groves have been bulldozed up and planted in cotton and other crops. There are too few bulldozers to do the work as fast as desired, and the sides of the trees in many groves have been hacked off with saws and axes to make more room in the middles to plant cotton. Cotton planting is being done on nearly every available piece of land and it is expected to reach 900,000 acres by the end of this month. The only mature crop today is carrots, which crop is now being harvested.

Texas growers are not taking the thing lying down. There is a belief in the Valley that old trees could not be expected to last much longer anyhow. Many growers are renting their land to be planted in cotton for removing the old trees, with the thought that they may later replant. Many growers are pruning back their old trees with the view of bringing them back to production. The young groves that have been cut back to the bank are coming out beautifully. The blackest most fertile soil is better adapted to other crops and less well adapted to citrus. It is expected that the geographical location will change and that there will be more acreage in the future north and west of where the heavy acreage now is.

Apply $^{d}_{p}$ DOLOMITE This Season

When you apply d/p Dolomite to your soil, you restore the acid-alkali balance and make available the calcium and magnesium that are absolutely necessary for vigorous growth and quality yields of citrus fruit, field crops and pasturage. Your fertilizer works harder, too, because d/p Dolomite conditions your soil for best results. So—make an extra profit from your soil this year by applying d/p Dolomite now.

When cost is a factor in very large groves and acreage, ask about low-cost high calcium limestone and high calcium limestone screenings as an economical source of calcium. Write for details.

DOLOMITE Products, Inc.
Plants at Lebanon (Levy County) and Sarasota, Florida
OCALA, FLORIDA

Advisory Committee Reviews USDA Research Program

Because of the important contribution research can make to the National economy, especially during the present defense effort, the Citrus Advisory Committee recommends that the present level of financial support for agricultural research be maintained. The Committee, which operates under authority of the Research and Marketing Act, met in Washington on March 28-30 to review all current and prospective research, service, and educational work pertaining to citrus and submitted recommendations concernnig the future course of such work.

The advisory group pointed out that "Because of the increased production of citrus in recent years, there is a special need for research and related services that will help bring the producers and consumers of this wholesome product together."

In its review of the over-all program, the Committee agreed that equal attention should be given to production, utilization, and marketing problems of the citrus industry and in each of these broad categories indicated certain specific lines of work which should be continued or expanded to the fullest possible extent.

With respect to production the Committee recommended that highest priority be given to continuation or expansion to these lines of work: Better control over citrus fruit diseases and insects with special attention to improved rootstocks; learn more about mineral nutrition, quality improvement, and pollination and fruit set; introduce and evaluate new breeding materials and breed better varieties of citrus for specific uses; and extend nematode control work to all areas where nematodes are a problem.

Utilization research of a fundamental nature, the Committee advised, should be aimed at improving and maintaining the quality of processed citrus; finding new food uses for citrus fruit and its by-products; seeking better uses for citrus residues and more satisfactory means of waste disposal at citrus processing plants.

In the field of marketing, the Committee gave a first and equal priority to the need for continuing or expanding the following types of work: Collect and distribute information about consumer purchases and the availability of citrus fruit in retail stores; study foreign production, competition, and demand for citrus and products; improve transportation equipment, services, and rates; improve methods of handling citrus fruit in connection with transportation, storage, and conditioning of citrus fruit; try to do a better job of preserving quality in marketing channels; increase operating efficiency by better use of available equipment and labor at all stages in the marketing process; improve merchandising methods and practices, with special reference to retailer training; expand extension work in getting the results of marketing research applied; and give fullest attention to marketing research on a regional basis.

The Citrus Committee spent one day at the Agricultural Research Center at Beltsville, Md., where members saw and discussed some of the work being done there, including, research at the insecticide test laboratory; citrus decay control work; the experiments with

(Continued on Page 22)

WHATEVER YOU GROW...
you'll find
it pays to use
NACO Fertilizers
NACO Sprays
NACO Dusts

★NACO knows Florida... Florida crops... Florida soils... all the conditions that give agriculture in Florida its unique characteristics.

★NACO has worked for many years developing and producing formulas to meet every condition in the state... NACO FIVE STAR is one of the best known fertilizers in Florida!

★NACO uses only the best materials... employs the best blending methods... watches production carefully to make sure that every NACO product is the best that can be turned out.

★NACO has a staff of trained field men covering the state... ready to help you with every type of problem that may come up. If you want assistance, just drop us a post card.

NACO FERTILIZER COMPANY

JACKSONVILLE 1; FLA. FORT PIERCE, FLA.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

The LYONIZER

Department

COMPILED BY THE LYONS FERTILIZER CO.

Reports Of Our Field Men . . .

WEST CENTRAL FLORIDA

E. A. (Mac) McCartney

We have had plenty of rain during the past few weeks and the new crop of fruit is setting in fine shape. Of course, we realize that it is entirely too early to tell what kind of a crop we will have this fall, but everything at this time is certainly indicative of a big crop. Trees are looking good and growers are beginning to plan their summer application of fertilizer. They plan to use good mixed goods with ample secondaries to assist in maturing a big quality crop. Most growers have been very busy with spray machines but we have been and at the present time are having trouble with red spider and we are now bringing this pest under control. Prices on most vegetable crops have been good but this territory is somewhat late and as a result we have not been getting the benefit of these prices. Citrus prices are fair and quite a heavy volume of fruit has been moving to market. There are some growers in a more optimistic frame of mind and are holding their fruit for what they believe will be better prices later in the season.

POLK HIGHLANDS & HARDEE COUNTIES

J. M. (Jim) Sample and Frank Chase

Our Summer application of fertilizer is now under way and will not be completed until June. It is gratifying to note that practically every grower is interested in using the mixture that will be most beneficial to his grove in the production of large yields and the finest quality. We are particularly interested in this program and are doing all possible to cooperate with growers in getting maximum results. We are having considerable trouble with all the various mites but so far we have been able to keep their damage to a minimum. However, the fight is not over and we will keep spray machines busy until they are thoroughly under control. During the week of April 15th we had some hail at various spots in the territory that caused damage. Foliage was ripped and in a few cases we saw young fruit so badly damaged that it will drop from the tree. Fruit prices are holding very well and a large volume is being moved to market. Due to maturity standards some of the concentrate plants have been unable to run to full capacity. Many growers are still hoping that when the plants are operating at full capacity the prices will be better. Some of the vegetable growers suffered some damage to their crops in Hardee County from too much rain, but it is hoped that prices will be high through the season and that growers will realize a profit.

SOUTHWEST FLORIDA

Eaves Allison

The heavy rainfall of early April over the northern and central parts of this area has insured ample moisture for a heavy setting of the new citrus crop. Both orange and grapefruit trees are carrying a big load of fine young fruit which something else besides a spring drought will have to knock off. Also many of these trees are still carrying a crop of ripe fruit which is being held for better prices. Whether this will pan out to be a profitable move nobody yet knows. The aforementioned torrential rains—5 to 6 inches—in the Ruskin-Palmetto-Sarasota sections, have done considerable damage to vegetable crops in the area. Several lesser rains, around one-half inch each, which followed very shortly after the big rain kept the ground wet and added to the damage. It is too early yet to prophesy but it looks like we might suffer considerable loss. The Fort Myers and Immokalee areas, where a good rain was needed badly, did not get much. That's the way it goes in farming.

HILLSBOROUGH & PINELLAS COUNTIES

T. D. (Tillman) Watson

While we have not suffered to any large extent this spring from dry weather, the recent heavy rains have been very beneficial in helping set a very fine crop of fruit for next season. This fruit is not only setting, but is making excellent growth and with favorable conditions throughout the season we are going to have a big crop and we are going to have some very nice quality. All varieties have bloomed very heavily with the exception of tangerines. Various mites have been giving us trouble but growers have been busy with their spray machines bringing these insects under control. The rains were also beneficial to other crops growing in the territory. Watermelons are growing in good shape and while they do not need too much moisture what we have had so far in most cases has been beneficial. We are getting under way with the Summer application of fertilizer and this will be completed by mid-June. Fruit is moving to market in quite a heavy volume and while prices have not been as high as many people expected they have been high enough to insure a profit.

NORTH CENTRAL FLORIDA

V. E. (Val) Bourland

All groves are looking very good and have the largest setting of fruit I think I have ever seen, with most of it growing off into what might be the largest set in history. Our Summer application of fertilizer has started and it appears that most growers will fertilize a little earlier than usual. All are hoping to do all possible to help this big crop develop into the finest of fruit. Red spiders have been bad in a large number of groves, but growers are doing all possible to bring these pests under immediate control. Valencia oranges are not passing maturity tests and prices are not satisfactory to the growers. Therefore, very little fruit is moving. A number of packing houses have closed for the season and others are running only part time. Some cukes are coming out of the wind damage nicely. Melons are also looking good. Lots of cabbage are in the field because of market conditions. Cattle are looking better since the pasture grass is growing. The cattlemen who planted winter clover last fall are reaping more benefits than anytime before due to cool weather and moisture, and where irrigation was possible it is still much better.

ONLY THE FINEST INGREDIENTS MONEY CAN BUY ARE USED IN LYONS FERTILIZERS

Seems like concentrate plants was going to reach their top production around the first of May and growers is hopin' that the heavy movement of fruit to all sources will result in an upward trend in the market. Since the season ended for mid-season fruit there hasn't been too much activity by plants usin' oranges for concentrates because the Valencias could not meet concentrate requirements. While some valencias has been used, certainly a large tonnage did not go to this source, so there is good reason for optimism by the growers as far as prices and consumption is concerned for the balance of the season. The recent rains has been mighty good to citrus trees durin' the past few weeks, and everything now indicates that we're goin' to have a bumper crop of fruit durin' the next marketin' season. Growers all over the state are workin' and plannin' to continue with every effort to produce big crops of finest quality fruit. As we have said before we aren't a bit alarmed over the possibility of over production. Everything is bein' done to establish and maintain new outlets and certainly with excellent quality there is no cause to worry that fruit of the type grown in Florida will not have first call when placed on the market for the consumin' public, whether it is fresh fruit, canned single strength or our very delicious concentrate .

Vegetable growers has had a rough time so far this season, but at the present time prices on most commodities are such that they are returnin' above cost of production and some profit to the producers. It is very much to be hoped that weather conditions will be favorable for the balance of the season and that prices may be bettered on some commodities in order that the season may be called a reasonably successful one.

Various mites has been workin' hard lately and we urge all growers to take the proper control measures without delay. Call your fertilizer or insecticide man and they can advise properly how to care for your individual problem. These men take a great deal of pride and interest in helpin' you git top results.

Pastures that has been properly fertilized and cared for is now in fine condition and the stock on these grasses are in excellent shape. Certainly they are paying dividends on the money that has been spent in improvin' pastures. Florida is already an outstanding cattle state and if cattlemen continue with their determination to improve their pastures we will continue in the limelight as one of the top livestock states in the union.

Uncle Bill

Money-Saving Device For Lime Growers

Costs of gathering Florida's citrus crops could be cut by almost one-third through use of better picking techniques.

So believes a University of Miami graduate student who made a time and motion study of picking operations in Persian lime groves of the Florida Lime and Avocado Growers association.

Charles Komiske decided to see how efficiently the work was being done and what could be done to improve it as his study for a master's thesis in management. He came up with a design for a new picking bag which speeds lime gathering 31% by actual stop watch tests and results in less worker fatigue. His findings on lime picking are applicable to other fruits, he believes.

He began by clocking pickers in a FLAG grove, and noted that the laws of scientific motion economy were being ignored. He timed 24 pickers in two groves and noted they spent an average of 29 minutes gathering a bushel of limes and walked an average distance of 989 feet between trees and field boxes.

Workers using a bag designed by Komiske instead of galvanized pails spent only 15 minutes gathering a bushel and traveled only 498 feet in 50 test timings.. He estimated FLAG's $14,000 yearly picking costs could be cut $4424 through use of the improved picking bag and good worker motions.

Plans for marketing the bag are being considered by Dr. Jean Lesperance, director of the Univesity of Miami time and motion study laboratory. It's a double-barrel gadget, with canvas tubes hanging from worker's hips. Fewer trips to field boxes are required with its use because it holds more than a pail. Since the bag is worn, pickers do not have to walk with each handful of fruit to where he left his pail.

The bag frees both hands for movements and causes less tiring of workers because their actions are balanced. Tests by Komiske showed idle time could be reduced by two-thirds, and the number of manual actions cut one-half.

Florida produces 95% of all limes grown in the U. S. Growers may be able to whittle off a big hunk of their picking costs because of the University of Miami study.

Special Advertising Set Up Featuring Valencia Oranges

Shifting of key personnel and the setting up of a special fund for the consumer advertising of Florida Valencia oranges keynoted recent action of the Florida Citrus Commission as the industry prepares to get into full swing with late season oranges.

Dawson Newton, advertising manager of the Commission, said this new campaign got underway April 12 and will continue through May 25, approximately the extent of the marketing period when the 23,000,000 boxes of Valencias remaining in the state will be consumed in one channel or another.

Newton said this emphasis on a "fringe market" area grew out of a recent meeting held by the Valencia Advisory Committee of the Sales Managers Club. At this meeting the representatives of some of the largest packing houses in the state specifically requested that the Commission make a special advertisnig effort in 11 key market areas in the West and Mid-West, areas normally served by Texas.

Cities chosen for this special promotional effort are Davenport, Des Moines and Waterloo, Iowa; Kansas City, Missouri; Omaha, Nebraska; Oklahoma City and Tulsa, Oklahoma; and Dallas, Fort Worth, Houston and San Antonio, Texas.

Newton said dealer service personnel will be pulled into these market areas from other states to enhance the effectiveness of the program. These men will coordinate merchandising at the store level with scheduled consumer advertising. They will arrange for mass displays and for free sampling of Florida orange juice in retail outlets. They will also make regular weekly reports to the Commission on the movement of fruit into the areas designated and consumer reaction to Florida citrus.

At the last meeting of the Citrus Commission, W. F. (Red) Robinson, Leesburg, Chairman, said the Florida citrus industry now has an excellent opportunity to take over the markets formerly served by Texas and

". . . if this is done right we can keep the markets but if it is not we will lose them to Texas as soon as they come back into production."

Robinson mentioned the Texas markets when he told commission members the industry was badly in need of increased advertising revenue to keep pace with the rapid expansion of Florida's already gigantic citrus industry.

Canners Advisory Committee Meets

The U. S. Department of Agriculture's Fruit and Vegetable Canners Advisory Committee held its first meeting in Washington recently to discuss with Department officials special Government and industry problems arising from the defense mobilization program. The meeting opened March 22.

The meeting was concerned largely with discussion of Government measures to meet the problem of providing armed services with essential supplies of canned fruits and vegetables. Other subjects discussed were manpower problems in the canning industry, the tin outlook, plant equipment and material problems, and transportation problems.

The Fruit and Vegetable Canners Advisory Committee is one of the groups established by Secretary of Agriculture Charles F, Brannan to advise the Department on problems related to the national defense program. It is composed of representatives of all segments of the fruit and vegetable canning industry and is under the chairmanship of S. R. Smith, director of the Production and Marketing Administration's Fruit and Vegetable Branch. Floyd F. Hedlund, deputy director of the Fruit and Vegetable Branch, is vice-chairman.

Other Government agencies represented at the meeting were the Office of the Quartermaster General and the Office of Price Stabilization.

Future meetings of the committee will be called, as necessary, by the Government chairman. The committee will also be available to other defense agencies of the Government for consultation.

The Fruit and Vegetable Canners Advisory Committee includes 18 industry members.

Special Citrus Program For U.S. Army Cooks

The importance of citrus in the basic diet will be brought home to Armed Forces' cooks through special arrangement with the Florida Citrus Commission, according to Dawson Newton, Commission advertising manager.

The program developed out of initial contacts made by Paul A. Dillard and James M. Basinger, two of the Commission's field men in the Chicago area. They conferred with Quartermaster officials and set up a meeting of officials and Newton during which plans for the inclusion of citrus in the school program were formulated.

Newton said he had been asked by the Quartermaster Corps to furnish a qualified authority to demonstrate citrus usage at the Quartermaster Subsistence school in Chicago.

"The request came from Lt. Col. Brown at the school," Newton said, "and we have requested two staff members of our food publicity firm, Dudley, Anderson and Yutzy of New York, to make arrangements to attend the June course of instruction.

"Miss Kate Titus, who has long worked on our food publicity, and Mrs. Martha Tupper, our home economist, will demonstrate citrus usage to cooks attending the school."

Newton added that the citrus experts will show the use of all types of citrus, both the fresh and the processed, with different methods of preparation, suited to both field and permanent camp installations.

"A test kitchen has been set up at the school where we can make our presentation," Newton said, "and if the proposed menu passes the school advisory board it will be integrated as a component part of the military dietary.

"The military forces set up a master menu, devoid of all frills and fancy stuff, one that gets down to the basic foods. We will have to devise a basic menu that could be poured out of a can, peeled conveniently, or sectionalized conveniently, in short, we need a citrus menu that utilizes citrus in a simple yet appetizing manner."

Newton added this was a part of the overall citrus promotional activity conducted this season as part of the program of the National

(Continued on Page 22)

Summer Care SUMS UP RESULTS AT PICKING TIME

DEPEND ON GULF

FOR YOUR COMPLETE BETTER FRUIT PROGRAM

• What your grove may need to produce the maximum quantity of QUALITY fruit may be quite different from the needs of your neighbor's grove. DEPEND ON GULF for the right fertilizers and the right spray-dust schedule for the crop in the making — ask your local Gulf Field Man to inspect your trees and fruit now.

GULF Friendly FERTILIZERS

ALSO USE GULF Brand DUSTS AND SPRAYS

THE GULF FERTILIZER COMPANY
Tampa and Port Everglades, Florida

FSC STUDIES CITRUS SHIELD FROM A-BOMBS

Florida Southern College at Lakeland has received a grant from the Office of Naval Research for further intensive investigation into the protective action of vitamin P from citrus against killing atomic radiation.

Dr. Ludd M. Spivey, president of FSC, announced that official papers have been received from Washington requesting the bio-research laboratory at the college to undertake additional laboratory studies on vitamin P for the Federal Government.

The Navy has been keenly interested in the experimental work already done by Dr. Boris Sokoloff, director, and Dr. Walter H. Eddy, associate director, of the laboratory on the use of vitamin P as a possible preventive against the deadly effects of atomic rays.

No Details Announced

No details of its contract agreement with Florida Southern were announced by the Navy.

Dr. Sokoloff has been doing intensive work on vitamin P for the past four years at the college. Under his direction, the bio-research laboratory succeeded in developing a low-cost method of extracting vitamin P from citrus waste. Prior to this development, the use of vitamin P on a widespread scale had been impractical because its extraction from citrus had been too costly.

The Pasco Packing Company, which operates the largest citrus canning plant in the world, presently is building a plant to produce vitamin P. It will be distributed on a national basis by the United States Vitamin Corporation, of New York City.

REVISED STANDARDS FOR CALIFORNIA-ARIZONA ORANGES PROPOSED:

The U. S. Department of Agriculture has announced a proposed revision of U. S. standards for California and Arizona oranges. Among changes proposed is a liberalization in the scoring of scale as a grade defect in U. S. No. 1 and U. S. No. 2 grades. Another important proposed change would permit navel oranges to be only fairly well colored when destined for export and when certified as meeting the standards for export.

The proposed revision is the first major change in standards for California and Arizona oranges since 1941, though the standards were slightly revised in 1949. The requirements of the present proposed revision are based upon recommendations of an industry committee representing both States.

SPECIAL CITRUS PROGRAM FOR U. S. ARMY COOKS

(Continued from page 21)

Citrus Merchandising Committee, of which he is chairman.

"Armed Forces usage of citrus will affect all citrus producing areas," he said. "We will all benefit from the increased usage as will members of the military benefit from having citrus in their daily diet."

Newton said the quartermaster officers had also requested copies of the Commission's films on citrus to be added to their stock of food films.

Clearance for the school participation was given Newton by the Commission at the last regular meeting of that group.

ADVISORY COMMITTEE REVIEWS USDA RESEARCH PROGRAM . . .

(Continued from page 17)

cold storage facilities and transportation equipment; some of the work at the recipe laboratory; and research on the nutritive value of certain food elements.

Members attending the meeting were: F. R. Wilcox, assistant general manager of the California Fruit Growers Exchange, Los Angeles, Calif., (chairman); Stanley B. Crockett, a producer of Harlingen, Tex.; L. S. Hamme, acting manager of the Texsun Citrus Exchange, Weslaco, Tex.; W. K. McCracken, president of the Treesweet Products Co., Santa Ana, Calif,; Raymond D. Robinson, vice president of Dr. P. Phillips Companies, Orlando, Fla.; Robbins Russell, general manager of Mutual Orange Distributors, Redlands, Calif.; and A. Vernon Saurman, general manager of the Florida Citrus Mutual, Lakeland, Fla.

At the close of the meeting Mr. Wilcox was reelected chairman and Mr. Saurman vice chairman of the citrus fruit advisory group. Roy Magruder, research coordinator in the Agricultural Research Administration, is executive secretary of the Citrus Fruit Advisory Committee.

CITRUS INSECT CONTROL FOR MAY 1951

(Continued from page 3)

spray for scale control during June or July.

The remarks made concerning six-spotted mites and their control are applicable to purple mites. However, with the satisfactory moisture conditions existing, it is not anticipated that there will be major injury from purple mites throughout the remainder of the spring and early summer months, and in most cases control of this mite will not be necessary.

For more specific information consult the Florida Citrus Experiment Station at Lake Alfred or Fort Pierce.

STORAGE TEST ON FLORIDA ORANGES, 1950

(Continued from page 7)

fected the keeping quality of the fruit in that slightly more decay was found in the Valencias grown on rough lemon than in those grown on sweet or sour orange rootstocks. The original data showed that small amounts of decay occurred during storage at 30° and 32°, while greater amounts were found at 38° F. Total decay increased with the length of the storage period and was regarded of economic importance when the storage was extended from 12 to 16 weeks.

(Results of the tests at New York will appear in the June issue of this magazine.—Editor.)

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$600.00 BUILDS COZY 4 ROOMS and bath. Concrete block. Stuccoed. Complete instructions $1.00. Saginaw Realty Agency, Box 992, Saginaw, Mich.

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QUALITY *is the Best Policy*

In these days of high production costs and low prices, quality citrus fruit is an absolute necessity to grove profits. And the grower who gets quality fruit is the one who CULTIVATES quality in the fruit, from bud to harvest.

You take no chances with the quality of your fruit when you feed reliable Armour's Big Crop Fertilizers to your trees. Armour's citrus producing Plant Foods are backed by more than a half-century of manufacturing experience. The name "Armour" on the bag assures you balanced, top quality goods, in excellent condition, every time. Place your order now for your requirements.

Drop us a card if you'd like a visit from an Armour Field Representative. There's no obligation for his advice on grove fertilizing problems.

ARMOUR FERTILIZER WORKS
JACKSONVILLE, FLORIDA

You, Too, Are Invited

To join that large and successful group of Florida Growers who have found that the slogan shown above is something more than a catchy advertising phrase . . . . the fact that you can produce Maximum Crops of Finest Quality with Lyons Fertilizers, is a simple statement based upon many years of practical demonstration . . . . Many of Florida's most successful citrus growers have profited year after year through the use of Lyons Fertilizers.

You, too, can profit by using Lyons Fertilizers

Lyons Fertilizer Company

Tampa, Florida

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Berryhill Hardware Company
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Walker's Grocery Co., Wauchula, Fla.
Farmers Supply Co., Immokalee
Norman Blocker, Blanton
Butler Feed Co., 409 13th St., Leesburg
H. C. Beckett Grove Service, Winter Garden
Dowling Feed Store, 715 9th St., Bradenton
Fox Feed Store, 418 W. Waters Ave., Tampa
W. B. Goding & Son, Apopka
Farmers Supply Co., Immokalee
Harry Goldberg, Pompano
Raymond Graham, Zolfo Springs
Hillsboro Feed & Milling Co., 3021 E. Broadway, Tampa
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McCord Feed Store, Winter Garden
Judson Nichols, Pierson
Robert A. Nordman, 232½ N. Clara Ave., Deland
John W. Parker, Arcadia
Ruskin Farm Supplies, Ruskin
Sarasota Feed Co., 9th and Lemon, Sarasota
A. H. Schrader, San Antonio
Slaughter & Taylor, Inc., 8th Ave., Palmetto
South Bay Growers, Inc., South Bay
J. C. Smith & Son, Lakeland
Smith Feed Store, 110 N. Rodgewood, Sebring
Sparks & Jordan, 5511 Nebraska Ave., Tampa
Taylor's Feed Store, Zephyrhills
Tampa Feed Co., 5904 Florida Ave.
Tarpon Feed & Supply Co., Tarpon Springs
Thornton Feed Co., 8718 Nebraska Ave., Tampa
Tuckett, Inc., Minneola
Unity Farms, Inc., Pahokee
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Wells Citrus Service & Supply Co., Tavares

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James M. Sample, Lake Hamilton
Eaves Allison, Sarasota
R. L. Padgett, Avon Park
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